

ORDER

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

6850.21

1/14/81

Reprinted with
CHG 1 4/17/81

SUBJ: FIBERGLASS LOW-IMPACT RESISTANT (LIR) STRUCTURES FOR APPROACH LIGHTING SYSTEMS

1. PURPOSE. This order announces the issuance of and directs the use of facility standards (drawing series D-6155) listed in appendix 1, and provides instructions for the installation of low-impact resistant (LIR) structures in the approach lighting system (ALS). These standards shall be site adapted by the regions for specific ALS projects.

2. DISTRIBUTION. This order is distributed to branch level in Airway Facilities Service; to division level in Logistics, Systems Research and Development, and Air Traffic Services, and Offices of Flight Operations and Airports Programs in Washington headquarters; branch level in regional Airway Facilities, Airports, Flight Standards, Logistic and Air Traffic divisions (except AEU); and to the Director, FAA Technical Center and the Aeronautical Center, and to Airway Facilities field offices having MALSR, ALSF-2 AND ODALS.

3. DEFINITIONS.

a. MALSR - Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights.

b. ALSF-2 - Approach Lighting System with Sequenced Flashing Lights, Category II, ILS.

c. ODALS - Omni-Directional Approach Lighting System.

4. BACKGROUND.

a. The need to provide low-impact resistant structures for all the approach lighting systems in order to reduce aircraft damage in the event of a short landing, was established in Order 6850.9, Revised Approach Lighting Criteria, dated 4/9/75. Low-impact resistant structural supports have been used in the MALSR system since 1975; however, such supports have not been available for the ALSF-2 systems.

b. The facility standards listed in appendix 1, have been developed to fulfill the need described above. For reasons of standardization and logistic simplicity, the fiberglass LIR structures detailed in these standards, are designed for use in the multiple approach lighting systems described in paragraph 6, Application.

Distribution: A-W(AF)-3; A-W(LG/RD/AT/FO/PP/AS)-2;
A-X(AF/AS/AT/FS)-2; A-YZ-1; ZAF-603

Initiated By: AAF-510

c. Order 6850.13, Medium-Intensity Approach Lighting System, 40 feet to 128 feet Mounting Height, directs the use of 20-foot fiberglass LIR structures. They are mounted on steel towers, where the light mounting height exceeds 40 feet. The use of these LIR structures shall continue as directed in Order 6850.13, until the previously procured quantities are exhausted.

5. DESCRIPTION OF LIR STRUCTURES

a. Use of Fiberglass LIR Structures.

(1) The fiberglass low-impact resistant (LIR) structures are used to support lights of approach lighting systems in a fixed alignment and orientation. Since the height of the support structure required for each approach lighting system varies for each light station, four different types of LIR structures are provided, which can be tailored in the field to a specific height. These four types of LIR structures are designated as MG-20, MG-30, MG-40 and MS-20; a typical of each is shown on drawing D-6155-1. Note that MG stands for Mounted on Ground, MS stands for Mounted on Steel Tower, and the numbers 20, 30, 40 and 20 indicate the approximate maximum height of the structure in feet. The range of the light mounting height for each type of LIR structure is as follows:

(a) MG-20 - From six feet one inch to 21 feet one inch above concrete foundation,

(b) MG-30 - From 21 feet two inch to 30 feet zero inch above concrete foundation,

(c) MG-40 - From 30 feet one inch to 40 feet zero inch above concrete foundation,

(d) Steel Tower + MS-20 - From 40 feet one inch and higher above ground.

(2) Steel towers are not furnished under the subject order.

(3) The LIR structures MG-20, MG-30 and MG-40 require cutting and bonding of the main vertical tube member, whereas MS-20 is a standard length (approximately 20 feet) structure which is to be mounted on different height steel towers, so that the total light mounting height is over 40 feet one inch above ground.

b. Standard Structural Parts. The standard structural parts of the LIR structures are listed in appendix 2. Various combinations of these standard parts are required to make different types of LIR structures for the approach lighting systems. To make the proper height LIR structure for a particular light station requires the cutting and bonding of the vertical member (six-inch I.D. fiberglass tube) of the structure. All cutting, bonding of tubes, and assembling of the standard structural parts shall be done in the Aeronautical Center, in conformance with the installation instructions furnished. Adhesives for bonding are not part of the standard structural items, but are locally procured and are also available from the manufacturer of the LIR structures.

c. MG-20, MG-30, and MG-40 Structures. Tube A (Item No. 12) and Tube B (Item No. 13) are fabricated in standard 20 foot lengths and are used in MG-20, MG-30, and MG-40 structures. To attain the proper height structures for each station in a lighting system, the tubes will be cut at the Aeronautical Center. The Aeronautical Center will cut all tubes and bond tubes where there is a requirement for a tube length greater than 20 feet. By having the Aeronautical Center cut and bond the tubes, maximum use of standard length tubes will be achieved while minimizing the waste of remaining tube lengths. For each project requiring MG-20, MG-30 and/or MG-40 structures, the region shall prepare a schedule calling out the required tube length. The schedule shall be included with the material requisition submitted to the Aeronautical Center.

d. The Variable V. For determining the proper light mounting height of each LIR structure, it is necessary to know the variable dimension denoted by V on drawing D-6155-1. This "V" is the dimension between the top of the six inch I.D. tube and the centerline of the lamp. Thus, "V" depends on the type of the lamp/light hardware to be mounted on each LIR structure.

e. Assembly Instructions. General assembly instructions for LIR structures are provided on drawings D-6155-21, and 22. Specific part assemblies are shown on drawings D-6155-1 through 17. Foundations shown on drawing D-6155-19 are representative only and shall be site adapted by the regions.

f. Raising and Lowering. All LIR structures are designed to be lowered to a height which makes them accessible for maintenance purposes. The LIR structures mounted on the ground, that is, all MG type structures, are provided with hinged bases which allow them to be lowered or raised by tilting the LIR structure on its hinged base. The hinged base for the MG-20 is called the mounting stand assembly (Item No. 15). MG-20 structures which are 12 feet zero inch in height or less, are easily lowered by "manually walking the structure down". For MG-20 structures greater than 12 feet zero inches in height, the use of a tilting device (see drawing D-6155-20) is recommended for lowering purposes.

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The hinged base for the MG-30 and MG-40 is called the mounting frame assembly (Item No. 16). Lowering is accomplished by the use of a lowering device (same as above) and a trailer jack (see drawing D-6155-20). The MS-20 structure is clamped in a base called the mast lifting frame (Item No. 17). The mast lifting frame is permanently attached in the field, to a steel mounting platform supported by a steel framework (NOTE: Steel mounting platform and steel framework are not included here). The MS-20 structure is raised and lowered by telescoping the structure vertically through the clamp on the mast lifting frame and through an opening in the steel mounting platform. A permanently attached winch is provided with the mast lifting frame for use in raising and lowering the MS-20 structure.

g. Electrical Wiring. All LIR structures shall be field wired in accordance with the electrical system drawings for MALSR, ALSF-2 or ODALS. The metallic bases of the LIR structures shall be grounded electrically as appropriate.

6. APPLICATION. The regions shall site adapt drawings D-6155-0 through 17, and 19 through 22 to install the LIR structures in the retrofit and establishment of:

a. ALSF-2 systems where the light mounting height is greater than six feet one inch:

b. MALSR systems where the light mounting height is greater than 40 feet one inch and,

c. ODALS systems where the light mounting height is greater than 40 feet one inch.

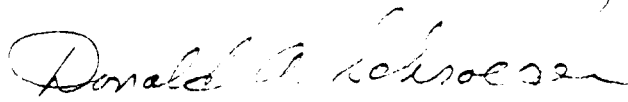
7. DEVIATION FROM STANDARD. No deviation from the standard is authorized without the prior approval of the Director, Airway Facilities Service. Regional site adaption to accommodate terrain, utility connections, parking lots, access roads, and similar details are authorized without further clearance. Dimensional errors, discrepancies, or suggestions for modification or addition of details should be brought to the attention of the Chief, Environmental Systems Division, AAF-500, Airway Facilities Service.


8. CORRECTIONS TO STANDARD. Corrections to the standard may be made by the Director, Airway Facilities Service, without further regional or interservice coordination. These may include corrections of dimensional errors, misspellings, and modification, addition, or deletion of details.

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9. DISTRIBUTION OF DRAWINGS. A reproducible copy of each drawing is being forwarded to the FAA Technical Center; each region, (except AEU), Attention: Airway Facilities Division; and two copies of each drawing to the Aeronautical Center, Attention: Chief, FAA Depot. Additional copies may be obtained from the Administrative Staff, Airway Facilities Service, Attention: AAF-10.



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Appendix 1

APPENDIX 1.
FACILITY STANDARDS DRAWINGS

<u>Number</u>	<u>Date</u>	<u>Rev.</u>	<u>Title</u>
D-6155-0	4-7-80		Title/Index Sheet
D-6155-1	6-30-83		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 6'-1"-128', Structure Configurations
D-6155-1-1	10/23/84		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 6'-1"-128', Structure Configurations
D-6155-2	4-7-80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 40'-1"-128', Tee, Tee-Brace, and Tube Cap Assemblies
D-6155-3	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 6'-1"-128', Tee-Brace Assembly, Tee-Brace Clamp Assembly and Details
D-6155-4	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 21'-2"-40', Horizontal Stabilizer Details
D-6155-5	6/30/83		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 21'-1"-40', Stabilizer Rod Assembly and Details
D-6155-5-1	10/23/84		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 21'-1"-40', Stabilizer Rod Assembly and Details

<u>Number</u>	<u>Date</u>	<u>Rev.</u>	<u>Title</u>
D-6155-6	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 6'-0"-128'-0", LIR Tubes, and Tube Splice
D-6155-7	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 6'-1"-128', Details for Tube "A", "B", and Tube Splice
D-6155-8	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 40'-1"-128', Mast Lifting Frame Sub Assembly
D-6155-9	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 40'-1"-128', Mast Lifting Frame Assembly
D-6155-10	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 40'-1"-128', Mast Lifting Frame Details
D-6155-11	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 40'-1"-128', Mast Clamp Sleeve Details
D-6155-12	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 40'-1" to 128'-0", Mounting Socket Assembly and Details
D-6155-13	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 6'-1"-21'-1", Mounting Stand Assembly

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<u>Number</u>	<u>Date</u>	<u>Rev.</u>	<u>Title</u>
D-6155-14	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 6'-1"-21'-1", Mounting Stand Details
D-6155-15	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 21'-2"-40'-0", Mounting Frame Assembly and Details
D-6155-16	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures Light Mounting Height 21'-2"-40'-0", Mounting Frame Details
D-6155-17	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 21'-2"-40'-0", Mounting Frame Details
D-6155-18	6/9/79		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Test Method & Requirements
D-6155-19	4/14/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 6'-1"-40'-0", Foundations for LIR Structures, MG-20, MG-30, & MG-40
D-6155-20	4/14/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Light Mounting Height 6'-1"-40'-0", Raising and Lowering of LIR Structures, MG-20, MG-30, & MG-40
D-6155-21	4/10/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Assembly Instructions for LIR Structures, MG-20, MG-30, & MG-40
D-6155-22	4/7/80		ALSF-2 (6'-128') & MALSR (40'-128') LIR Structures, Assembly Instructions for LIR Structure, MS-20

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Appendix 2

APPENDIX 2.
EQUIPMENT NATIONAL STOCK NUMBERS

Standard Structural Parts of Fiberglass LIR Structures

Item No. (Refer to drawing D-6155-1):

1. T-5 Tee-bar assembly
NSN: 5445-01-079-3885-1
2. T-4 Tee-bar assembly
NSN: 5445-01-079-3886-1
3. T-3 Tee-bar assembly
NSN: 5445-01-079-9155-1
4. T-M Tee-bar assembly
NSN: 5445-01-079-9154-1
5. Tube cap assembly
NSN: 5445-01-079-7557-1
6. Tee brace assembly
NSN: 5445-01-079-9153-1
7. Tee brace clamp assembly
NSN: 5445-01-079-9152-1
8. Horizontal stabilizer for MG-30
NSN: 5445-01-079-9151-1
9. Horizontal stabilizer (U & L) for MG-40
NSN: 5445-01-080-3039-1
10. Stabilizer rod assembly 14 ft.
NSN: 5445-01-080-5144-1
11. Stabilizer rod assembly 24 ft.
NSN: 5445-01-079-9132-1
- 11-1. Stabilizer rod assembly 10 ft.
NSN: 5445-01-108-4919-1
12. Tube "A" x 20 feet
NSN: 5445-01-079-9135-1
13. Tube "B" x 20 feet bonded to tube splice
NSN: 5445-01-079-9148-1

14. Tube "A" x 20 feet bonded to mounting socket assembly
NSN: 5445-01-079-9134-1
15. Mounting stand assembly
NSN: 5445-01-080-2763-1
16. Mounting frame assembly
NSN: 5445-01-080-2762-1
17. Mast lifting frame assembly
NSN: 5445-01-079-9133-1
18. Repair tube splice x 12 inches
NSN: 5445-01-079-9149-1

Tilt Device and Trailer Jack

Item No. (Refer to drawing D-6155-20)

1. Tilt device
NSN: 8200-00-300-1728-1
2. Trailer jack
NSN: 5120-01-098-7375-1

NOTE: The suffix -1 in the NSN designates F&E stock. For operations stock of the above items, delete the suffix -1 in the national stock number.

REMARKS FOR INFORMATION ONLY:

1. Tee-bar assemblies T-3, T-4 and T-5 are used in the ALSF-2 system, whereas T-M is used in the MALS portion of the MALSR system.
2. To make a complete Tee-assembly, use one Tee-bar (Item 1, or 2, 3, or 4, as required), one tube cap (Item 5), two Tee braces (Item 6), and one Tee-brace clamp (Item 7).
3. One Item 8 (Horizontal stabilizer for MG-30) is required for each MG-30 LIR Structure. One Item 9 (Horizontal stabilizer for MG-40) is required for each MG-40 LIR structure.
4. Item 10 are 14 foot guy rods for MG-30. Item 11 are 24 foot guy rods for MG-40 for FY-1979 projects.
5. For FY-1980 and later projects the 24 foot guy rod assembly has been revised. Use one Item 10 (14 foot guy rod) and one Item 11-1 (10 foot guy rod).
6. Item 15 is base for MG-20; Item 16 is a base for MG-30 or MG-40; and Item 17 is a base for MS-20.